



**HEWLETT
PACKARD**

68000/68010 Preprocessor Interface Module

MODEL 64674A

TECHNICAL DATA 1 JUL 84

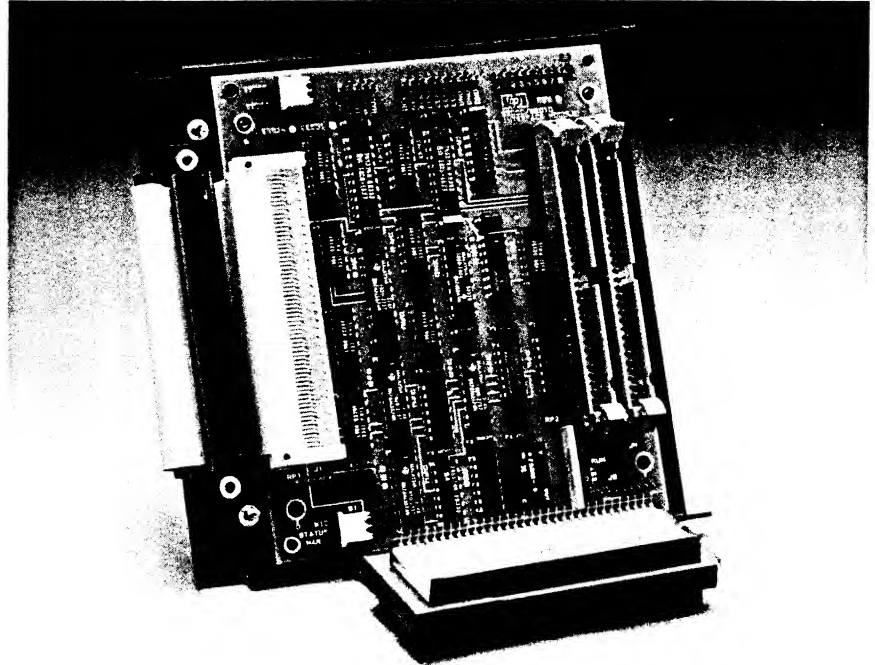
Description

Model 64674A Preprocessor Interface Module provides a quick and convenient interface between 68000/68010 microprocessor systems and a 60-channel HP 64620S Logic State/Software Analyzer. The interface is installed in an HP 64650A General Purpose Preprocessor for a direct interface to the software analyzer. Your measurements can be made in the same language you use for programming, 68000/68010 assembly, Pascal, or C languages. At any level of design complexity, the interface/analyzer combination addresses your analysis needs.

Connection to 68000/68010 system is through a low-profile, 64-pin dual-in-line probe/chip-carrier that replaces the microprocessor in the target system. The target processor is inserted on top of the carrier. All microprocessor bus activity is monitored nonintrusively, in real time.

Interface control software formats the HP 64620S analyzer for 68000/68010 measurements, and symbols from the linker tables can be used as softkey labels for the added convenience of symbolic tracing. Inverse assembly translates the trace lists into 68000/68010 mnemonics, and when a C or Pascal compiler is used, the trace list may also include the high-level source statements together with the comment fields.

The interface tailors an HP 64620S software analyzer for 68000/68010 microprocessor applications. HP 64674A interface accesses the measurement power of the software analyzer for efficient and effective debugging, troubleshooting, and optimizing.



Interface/Analyzer Features

- Real-time, nonintrusive logic state measurements
- Fast, convenient, and reliable interconnection
- Disassembly of 68000/68010 instruction set for easily read trace lists
- Trace mode for DMA cycles
- Performance analysis for software optimization
- HP 64620S Software Analyzer automatically configured for 68000/68010 system measurements
- Symbolic tracing for quick setups and interpretation
- Optional display of high-level language source lines
- Interactive with other HP 64000 subsystems:
 - Another interface and HP 64620S Logic State/Software Analyzer
 - HP 64600S Logic Timing/Hardware Analyzer
 - HP 64310A Software Performance Analyzer
 - Any HP 64000 Emulator

First Steps

Connecting the 68000/68010 target system to the HP 64620S software analyzer using the HP 64674A interface is quick, taking only one or two minutes. With the link established, three keystrokes of the softkeys produce a trace listing in 68000/68010 mnemonics (figure 1). Many of your troubleshooting problems can be solved at this level with simple triggering conditions. Set up the analyzer to show a listing of target system activity before, after, or around a specified pattern of address, data, and status signals. Add the DMA cycles, or omit them. Qualify the measurement to include only read cycles, or write cycles. Measure the elapsed time between each stored state (relative time) or from the trigger point to each state (absolute time). Specify the measurement using symbols for routines and modules listed in the linker table, or add new symbols as you need them; this eliminates referring to the linker table for new addresses each time you modify code. The basic features save you analysis time, making your troubleshooting and debugging efforts more productive.

High-level Programming Languages — High-level Analysis

With complex microprocessors, programming in high-level languages becomes much more practical. High-level languages improve programmer efficiency and produce transportable code. A logic analyzer that displays measurements in the same languages simplifies analysis.

The HP 64620S analyzer and HP 64674A interface can list source statements of 68000/68010 programs written in C and Pascal. All of the original symbols are used, and the comment fields are included with each source line. High-level displays make it easier to compare actual system execution to your program listing. One of the displays preferred by software engineers shows the assembly-level code associated with each high-level source statement (figure 2).

| Trace List | | | | State 7, 68 channel, 68000 interface | |
|------------|---------|------|-------|--------------------------------------|------------|
| Label: | ADDRESS | DATA | 68000 | Mnemonic | time count |
| Base: | hex | hex | hex | hex | rel |
| Mac: | | | | | |
| +001 | 00014E | 5887 | 4002 | L 04,07 | 0.48 used |
| +002 | 000150 | 2B47 | MOVE | L 07,2507(45) | 0.53 used |
| +003 | 000152 | 2501 | 2507 | supr program read | 0.46 used |
| +004 | 000154 | 2220 | MOVE | L 2510(45),01 | 1.00 used |
| +005 | 000207 | 0000 | 0000 | supr data write | 0.50 used |
| +006 | 000208 | 0004 | 0004 | supr data write | 0.48 used |
| +007 | 000210 | 2510 | 2510 | supr program read | 10.28 used |
| +008 | 000153 | 0280 | 4001 | L 2508(45),01 | 0.48 used |
| +009 | 000150 | 0000 | 0000 | supr data read | 0.50 used |
| +100 | 000212 | 0000 | 0000 | supr data read | 0.49 used |
| +101 | 000154 | 2508 | 2508 | supr program read | 0.52 used |
| +102 | 000155 | 0287 | 4001 | L 07,01 | 0.48 used |
| +103 | 000208 | 94F3 | 94F3 | supr data read | 0.50 used |
| +104 | 00020A | 2108 | 2108 | supr data read | 0.48 used |

STATUS: Awaiting state command - user id AG4674 16:32

display ADDRESS absolute then DATA then mnemonic absolute then count,rel,e

BACK: stop not-high rolled width relative absolute -- F1000

Figure 1. Model 64674A generates a trace display of target system activity in the mnemonics of the 68000/68010 microprocessor. The data is collected nonintrusively in real time.

| Trace List | | | | State 7, 68 channel, 68010 interface | |
|--|------------------|------|--------|--------------------------------------|--|
| Label: | ADDRESS | DATA | 68010 | Mnemonic | |
| Base: | hex | hex | hex | hex | |
| Mac: | symbols | | | symbols | |
| BEGIN | | | | | |
| B := 4; | | | | | |
| trigger PAS.TEST+00002A 2B7C MOVE.L 00000004,2504(45) | | | | | |
| store disable enable 00000000,00000000,00000000,00000000 | | | | | |
| +001 | PAS.TEST+00002C | 0000 | 0000 | supr program read | |
| +002 | PAS.TEST+00002E | 0004 | 0004 | supr program read | |
| +003 | PAS.TEST+000030 | 2504 | 2504 | supr program read | |
| PAS.TEST+000030 PAS.TEST:AG4674 - line 13 | | | | | |
| D := 2B7C; | | | | | |
| +004 | PAS.TEST+000032 | 2F20 | MOVE.L | 2510(45),-1(A7) | |
| +005 | dPAS.TEST+000004 | 0000 | 0000 | supr data write | |
| +006 | dPAS.TEST+000006 | 0004 | 0004 | supr data write | |
| +007 | PAS.TEST+000034 | 2510 | 2510 | supr program read | |
| +008 | PAS.TEST+000036 | 2F20 | MOVE.L | 2504(45),-1(A7) | |

STATUS: Awaiting state command - user id AG4674 20:53

disassemble from_line, number 0

display: LINE # disassembly source stop execute -- F1000

Figure 2. One display mode of the HP 64620S analyzer and the HP 64674A interface shows the high-level source statements and comments (inverse video) followed by the assembly-level code generated by the statement. A combined display is convenient when troubleshooting programs written in C or Pascal.

Coping with Complexity

Many analysis questions can be resolved with simple trace specifications, but when you are faced with complex or elusive software bugs, the HP 64620S software analyzer has the extra measurement power you need.

By using the 68000/68010 function codes as qualifiers, you can restrict a measurement to any combination of supervisory, user, program, data, and interrupt-acknowledge operations. Specify events as sequence terms, store qualifiers, and restart terms, together with count qualifiers to track down intermittent problems wherever they occur (figure 3). Measurement windows set up a trace list of only the activity in a nested code module you suspect is malfunctioning.

Once the software is debugged, you want to optimize program execution and eliminate flow problems. The HP 64620S software analyzer has three overview measurements to evaluate total system performance. You can compare memory activity for several subroutines or modules with a histogram display (figure 4). A second histogram display shows the execution time of a defined module or address range. To monitor the flow of activity between procedures, a graph shows you the sequence of program activity against time. Overview measurements let you judge where modifications are needed when eliminating bottlenecks and smoothing program flow.

Interactive Analysis for System Integration

By adding a Model 64600S Logic Timing/Hardware Analyzer, you can take advantage of the interactive state and timing measurements for integrating hardware and software that constitute your completed 68000/68010 product or design. Cross-arming the analyzers with the Intermodule Bus synchronizes state and timing measurements to isolate problem sources quickly. The 2.5 ns resolution of the HP 64600S hardware analyzer supports detailed signal analysis.

Add a second HP 64620S software analyzer to investigate multiprocessor systems. Interface modules are available for popular microprocessors, and a general-purpose interface tailors measurements of discrete logic designs. Interactive state analysis supports detailed analysis no matter how complex the target system.

Emulators can also be added to your interactive measurement system to take advantage of the run controls available with an emulator. For additional macro measurements, the HP 64310A Software Performance Analyzer offers extra measurements that aid in evaluating total system performance.

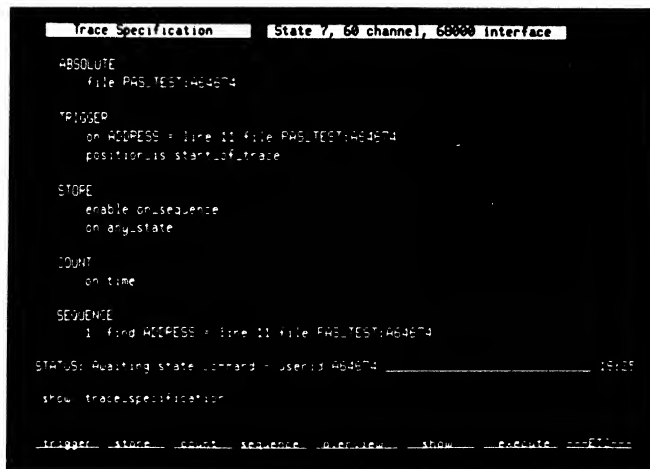


Figure 3. Interface software automatically configures the HP 64620S analyzer for measurements appropriate for 68000/68010 microprocessor-based designs. Defining trace specifications is simple and quick, even for complex measurements that include trigger sequences, windows, and qualified data storage.

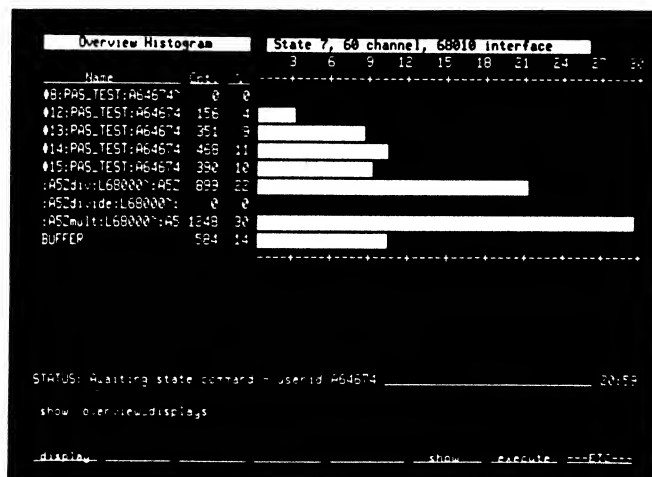


Figure 4. A histogram of memory activity is an immediate and graphic description of how the 68000/68010 resources are actually used by code modules and subroutines in the executing target system.

Making a Difference

However complex your 68000/68010 system, using the HP 64674A interface and the HP 64620S software analyzer offers the power and flexibility for debugging and optimizing your software. Even the most complicated measurements are quickly applied and understood. As measurement needs grow, you can be assured that the interface and HP 64000 measurement subsystems can address even your most advanced applications. The HP 64674A 68000/68010 interface gives you the benefits of fast, easy measurement setups, shorter design cycles, and increased productivity to gain a competitive edge. When time-to-market is a key factor in your success, the HP 64000 system has the tools you need for fast, efficient product development.

Specifications

Processor Compatibility: compatible with Motorola® MC68000/MC68010 and any other microprocessor that complies with specifications of either microprocessor.

GENERAL

Maximum clock speed: 12.5 MHz.

Signal loading: one LS TTL load for all monitored lines plus approx 35 pF capacitance.

Outputs: STIMULUS and HALT are LS TTL open-collector, active-low outputs; max sinking current, 6 mA.

Input: ACK, acknowledge for STIMULUS line active low, TTL level.

Power: 68000/68010 microprocessor operating current drawn from the target system; all other power supplied by the HP 64620S software analyzer.

ENVIRONMENTAL

Temperature: operating, 0° to +55° C (+32° to +131° F); nonoperating, -40° to +75° C (-40° to +167° F).

Altitude: operating, up to 4600 m (15 000 ft); nonoperating, up to 15 300 m (50 000 ft).

Humidity: 90% noncondensing. Avoid sudden, extreme temperature changes that could cause condensation within the instrument.

ACCESSORIES SUPPLIED

Model 64674A includes the interface board and all appropriate connectors and cables for installing the board in Model 64650A general purpose preprocessor; a 305 mm (12 in.) flexible cable to target system terminates in a low-profile 64-pin dual-in-line probe/chip carrier with a ZIF socket for the target 68000/68010 microprocessor; interface operating software on flexible disc; and operators manual.

Ordering Information

Model 64674A 68000/68010 Preprocessor Interface Module

Note: Model 64674A must be installed in Model 64650A General Purpose Preprocessor.

Model 64650A General Purpose Preprocessor

Model 64620S Option 011 60-channel Logic State/Software Analyzer